Permitting of Small and Medium Sized Wind Turbine Projects in Idaho

A Handbook Guide with Specific Examples for Counties of

Bonneville, Cassia, Elmore, Jerome and Twin Falls

Idaho Department of Water Resources
Energy Division
Boise, Idaho
November 2005

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Cover Photo: Wolverine Creek Wind Park near Idaho Falls, Idaho (IDWR photo)

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This document represents the compilation of information from a variety of sources. Much of that is subject to change over time and, in fact, some of this subject matter is already in the process of revision. Some information is the result of personal interviews and as such may be subjective and may not represent the opinion of individual state or county officials. This document is presented as a helpful handbook informational guide only. Anyone seeking to permit a project is advised to check with local authorities to ensure compliance with existing or new requirements.

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Any opinions, findings, conclusions, or recommendations expressed in the report are those of the author(s) and do not necessarily reflect the views of the sponsoring federal agency or the Idaho Energy Division.

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I. Introduction

Many people think it's obvious that Idaho has wind resources and that we should develop the renewable power opportunities that are available. Putting wind to work has been a goal of civilization down through the ages. Wind is a free, renewable fuel that has been used to power ships, grind grain, and pump water. Technical improvements over the past decade have increased the size and power output capacity of wind turbines, significantly reducing the cost of using wind to generate electricity. Federal and state funded research, development, and other financial incentives, such as payments tied to production and tax benefits, have spurred wind project development in recent years. Other states with lesser wind resources have developed major projects mainly because of the political will and favorable policies, which have enabled developers to capture the opportunity for wind power. Idaho has more wind potential than California, the current leader in wind energy production, and in fact Idaho's potential is ranked 13th in the nation. The United States Congress and the Idaho State Legislature have recently developed new incentives for wind energy development. Specific resources are being identified and assessed around the state. Thus Idaho is poised to develop a wind generation industry.

Until recently, Idaho's use of wind has been limited to the many old water pumping mechanical windmills across the state, though few of them are still functional. Meanwhile, many areas around the world are developing wind projects at a record pace:

> According to the European Wind Energy Association, wind is capable of supplying 10% of the world's electricity within the next 20 years-- even if electricity usage doubles during that time.
>
> In 2002, 7,227 megawatts (MW) of wind energy were installed around the world, representing a gain of 29 percent. More than 1,687 MW of wind energy capacity was added across the United States during 2003 alone, enough to serve about 425,000 average U.S. households. There are more than 61,000 wind turbines installed worldwide, capable of generating 32,000 MW. Germany remains the world's leader with 14,600 MW of total installed capacity. The United States is second with 6,370 MW of installed capacity with installations in 30 states. Spain and Denmark are third and fourth, with 6,202 MW and 3,110 MW installed, respectively. The top five states are: California with 2,043 MW of installed capacity; Texas with 1,293 MW; Minnesota with 563 MW; Iowa with 472 MW; and Wyoming with 285 MW total.
>
> Wind energy growth in Europe has been so strong that the European Wind Energy Association has raised its goal for the region by 50%, from 40,000 MW of installed capacity by 2010 to 60,000 MW, enough to meet two-thirds of California's electricity demand.
>
> If recent announcements are any indication, the future continues to look bright for this flourishing sector of the energy industry: France plans to install 5,000 MW during the decade; Argentina plans to install 3,000 MW; China plans to install 2,500 MW by 2005; and, the United Kingdom sold offshore rights for the installation of 1,500 MW.
> *-Adapted from information provided by the American Wind Energy Association*

The development of a wind generation project whether large or small can become a long drawn out process if it is not managed well from the outset. This handbook has been prepared to help individuals, farmers, ranchers and small companies get started on the right track.

Because wind power generation is a new energy source in the Gem State, most Idahoans have little or no idea what is involved in the installation of a small or medium sized wind turbine project. Having a manual or handbook that can be used to walk through the lengthy permitting process should greatly help them. The Idaho Energy Division has published this manual to help people negotiate the required steps.

What are the benefits of wind energy?

Wind energy is inexhaustible and non-polluting. Running a single 1-MW wind turbine can displace 2,000 tons of carbon dioxide in one year (equivalent to planting one square mile of forest). It is also compatible with mixed land use such as grazing or agriculture. Wind energy projects are modular and the development and construction process is relatively fast when compared to bringing a new coal or natural gas plant on line. Wind output prices are not susceptible to price fluctuations like electricity generated from petroleum based fuels. Once a project is installed, it can keep generating clean energy for 20-30 years or even more with only ongoing maintenance expenses.

Additional rural benefits include:

Economic diversification - Wind energy can help homeowners and businesses reduce or eliminate electric bills. It can provide farmers and ranchers with a new source of long-term revenue without a significant impact to existing agricultural operations. Typically only the footprint of the turbine towers and the access roads are taken out of production. New jobs for wind turbine construction, operation, and maintenance are created, some materials and supplies can be purchased locally, and landowners will benefit from energy payments or from lease payments from developers of commercial projects.

Increased tax base – Commercial wind projects make significant payments to local taxing authorities (school districts, town, county, or state governments) that broaden the local tax base and provide new local revenue, with the potential to reduce tax burdens on local residents.

II. Energy Markets

A. Net Metering

Net metering is a means of offsetting monthly electric bills. With net-metering, a utility customer can generate electricity renewably (including with wind) onsite, utilize whatever electricity is needed at a given time and sell excess electricity back to the utility company. When a customer is consuming more electricity than it is producing, electricity flows from the grid to the customer; when a customer is producing excess, the electricity flows from the generator to the grid. At the end of the specified time period (typically each month), the customer is charged for net electric usage.

Net metering is available in 38 states, and the rules vary from state to state. In Idaho, net metering for residential customers is available up to 25 kilowatts (kW) and for commercial customers up to 100 kW. For residential customers, the meter simply spins backwards when excess power is generated and the utility pays the same rate that it charges. For commercial customers, the utility pays 85% of the published mid-Columbia rate for excess generation. The mid-Columbia rate is a variable rate.

In other states, the net metering laws are varied. For example, California currently encourages larger net metering up to 1000 kW. California has consistently supported renewable energy projects and thus has more net-metering customers than other states.

B. Federal and State PURPA

The Federal government enacted the Public Utility Regulatory Policy Act (PURPA) in 1978 in the midst of the energy crises that threatened industrial world economies. Congress acted to reduce dependence on foreign oil, to promote alternative energy sources and energy efficiency, and to diversify the electric power industry. One of the most important effects of the law was to create a market for power from non-utility power producers, which now provide between 7-10% of the country's power.

Before PURPA, only utilities could own and operate electric generating plants. PURPA required utilities to buy power from independent companies up to certain limitations and as long as the generator was a "Qualifying Facility" or QF. The payment for such energy was set at a rate which was determined to be the utility's "avoided cost" of the next possible generation resource. Each utility has a different avoided cost in each state.

PURPA set the size limitation to be up to 80MW for commercial projects, but allowed each state to set its own rules for the qualifications for published rates. In the fall of 2004 the Idaho Public Utility Commission (IPUC) ruled that Qualifying Facilities of 10 average megawatts capacity per month or less shall be paid the published avoided cost rates for PURPA power purchase agreements. The state has set the contract term limitation to be up to 20 years and publishes new rates each year.

In June of 2005, Idaho Power Company requested that the IPUC temporarily suspend their federal obligation under PURPA to purchase wind power from QFs. Pacificorp and Avista, Idaho's other two investor-owned-utility companies, intervened to have the same moratorium on new contract requirements apply to them also while they study effects of wind projects on their grids.

On August 23, 2005, the IPUC finalized *Order No. 29839* regarding the Idaho Power request for moratorium. Instead of granting the moratorium, this IPUC order reduced the published rate eligibility cap from 10 aMW to 100 kW. This means that QFs of 100 kW or less nameplate generating capacity are eligible to receive the published guaranteed rates referenced above. QFs larger than 100 kW are still allowed, but they are not guaranteed the published rate. Instead, new QFs which exceed the 100 kW limit must individually negotiate power purchase contracts.

It is important to note that this issue remains in a state of flux at press time. Idaho Power Company is hosting an ongoing series of workshops regarding PURPA wind energy contracts. For more information on this issue, contact the IPUC at http://www.puc.idaho.gov or (208) 334-0300.

C. Wholesale Energy Markets

The energy produced from a commercial project may be sold either locally or to a distant utility. If the energy is marketed elsewhere, there is a charge for the local utility to transport or "wheel" the energy across its system. As long as capacity is available in its lines, the utility is required by law to make that available so a generation source can get its energy to a market. However, the existing utility system has many transmission constraints in specific locations that may limit the locations to which energy can be transmitted at different times of the year.

In Idaho only a utility company can sell energy at retail to an end user. Thus, a wind project can only sell to a utility company that then can sell the energy to its customers. Power generators cannot sell energy to a neighbor, for instance, but can use the power themselves.

III. Types and Sizes of Projects

Many farms and ranches have potential wind resources with commercial viability at a smaller scale than that which was possible even a few years ago. Some project sites may even have full commercial potential. Without high quality data collection and analysis, it is difficult to justify a home scale generation project, let alone the millions of investment dollars required for a small utility-scale generation system. Some new improvements in wind turbine efficiencies have enabled installations at sites which were previously not economically possible.

The following descriptions are not necessarily authoritative, but are a general depiction of the types and sizes of wind projects currently being developed or considered in many areas around the country as well as in Idaho.

A. Net Metering

In Idaho, net metering projects for residential applications are available up to 25 kilowatts (kW) total size. Wind turbines in this size range are typically mounted on 80 to 120 feet tall towers. Turbine rotor diameters are typically up to 30 feet in diameter and usually have three fiberglass blades. For commercial applications, the size limit is up to 100 kW in Idaho. Such turbines usually have towers less than 150 feet tall. Usually net metering projects consist of one single turbine. These are very simple projects; they have low impacts during construction and operation. Connection is at the customer's side of the meter so the electricity generated effectively offsets the electric bill. Existing programs to do this differ from utility to utility. The most beneficial aspect of net metering programs is that the energy is essentially exchanged at the rate paid to the utility so the accounting is simplified. The best programs allow the utility to pay the customer cash or carry forward a balance indefinitely so the maximum benefit of the turbine can be captured and offset the energy usage whenever it may occur. The worst type of net metering program zeroes the balance each month. This could mean that someone with an irrigation load in the summer and perhaps a winter wind resource would get almost no credit off the bill for the energy delivered. The rate that may be paid for the energy produced may be far less than the rate paid for the pump energy usage in such a circumstance. California has consistently supported renewable energy projects and thus has the majority compared to other states. California currently encourages larger net metering up to 1000 kW.

B. Smaller Distributed Generation Projects

These projects are often less than 1 megawatt (MW) – but may be up to 2 or 3 MW conceptually as an overall project size. Technically a distributed generation project is connected to a utility distribution line similar to a load with appropriate disconnection devices. The theoretical maximum size of a distributed generation project is about 10MW, though in many specific cases it would be limited to much lower total project capacities and in some cases could be slightly higher. The size is very dependent on the local lines and loads already connected to them. There are many inherent benefits to distributed generation for the utilities since the generation can reduce the overall loading of the local power lines. Sometimes such projects are put together from rebuilt older wind turbine units or newer smaller units. They may include just a few turbines or may be set up with several units near each other. One older project in Hawaii has more than 80 turbines at 20kW and smaller to add up to a total project size of 2.3MW. This may be the most extreme example of such a project. Some of the older turbine designs are somewhat louder and faster rotating than the newer units. These projects often consist of smaller turbines, typically 100 to 800 kW per turbine, though they could consist of just a few of the very large newer units available.

Investor-owned-utility companies (Idaho Power, Pacificorp and Avista in Idaho) are required under PURPA to purchase power for Qualifying Facilities and to negotiate in good faith. Projects greater than 100 kW are not eligible for the guaranteed published rate, but are able to negotiate a rate based on avoided cost. (See section **II. A. Federal and State PURPA**.)

C. Small Commercial Scale Wind Farms

Small commercial scale projects typically will range up to 10 MW total size and most often will use newer advanced large turbines. These projects will most likely have towers over 200’ high and blade diameters as large as 250’ or greater. The individual turbine generator output may be 1.5MW or larger with modern extremely quiet, slow rotation speed designs. There is an overlap between the smaller commercial and larger distributed generation projects that is undefined. This type of project may be connected to a larger distribution line but is more likely sited to take advantage of a small scale transmission line with the appropriate substation for the location. Longer spacing between turbines is typical and the total project may consist of four to seven units depending on turbine size.

Similar to smaller distributed projects, small commercial Qualifying Facilities are eligible under PURPA to negotiate sales agreements with investor-owned-utility companies. Energy in this size range could be wheeled to more distant energy markets, but is optimally sold to the local utility.

D. Medium to Large Commercial Scale Wind Farms

Full scale commercial projects are often 100MW in size. Sometimes they may be larger in that they can grow to several hundred MW; sometimes they may be smaller, in the 50MW range. Usually such projects end up with 50 to 100 turbines and require large amounts of land overall, but the actual footprints are much smaller. Therefore livestock grazing, for example, is minimally impacted. Typically the turbines are located on large windy ridges. These projects require larger substations and transmission lines. A negotiated sales agreement – with the local utility or a distant utility – is standard, often in response to a utility company's request for proposals to develop wind generation projects.

IV. Installing Small Wind Power Generation Systems

Extensive preliminary work in the determination of several aspects of a project must be completed before the permitting stage can begin. With the smaller wind power generation systems the extent and amount of this preliminary work can be minimized.

A. Resource Assessment

The first part of any wind project involves an assessment of the overall resource. The size of the project and anticipated investment help dictate the expense and scope of the wind resource assessment itself. For a small single turbine net metering type of installation, average wind speed data from an airport anemometer or other nearby resource such as a state sponsored wind anemometer site may be adequate. Essentially the decision to spend the time and money on a wind project may be based on the payback period for the amount of generation expected compared to the capital cost of the overall project.

Average wind speed information may be acceptable for estimates of energy production as long as the project financing is not dependent on specifically accurate energy output projections. In some cases, "flagging" (wind-caused deformations of trees) can be considered an adequate indication of resource.

B. Evaluating the Site

Site evaluation is the key aspect in determining what kind of wind project to develop and what turbine or turbines to select for the area. Sustained wind speeds are critical to a project's economic viability; however, for smaller projects the suitability of the site itself may be the most critical factor. Proximity to buildings, trees and the utility interconnection point need to be considered and weighed with other factors to minimize the length of the electric line, while siting the turbine to interfere minimally with prevailing winds.

C. Positioning the Turbine

Smaller net metering projects typically require the turbine be located in close proximity to the utility meter. Thus, the expense of interconnection is minimized even though the cost of the turbine may be higher on a per kW basis. Still, it is important to minimize the effects of local structures and terrain even with smaller net metering installations. If the vast majority of the prevailing winds come from one or two directions, then the turbine can be located on the windward side of structures or trees. See Figure 1 for a depiction of obstruction avoidance when positioning turbines. If the wind comes from many directions, it should be located as far from such interference as possible. Not only does the interference block the wind, but it also can create turbulence which is harder on the turbine and can severely reduce the power output.

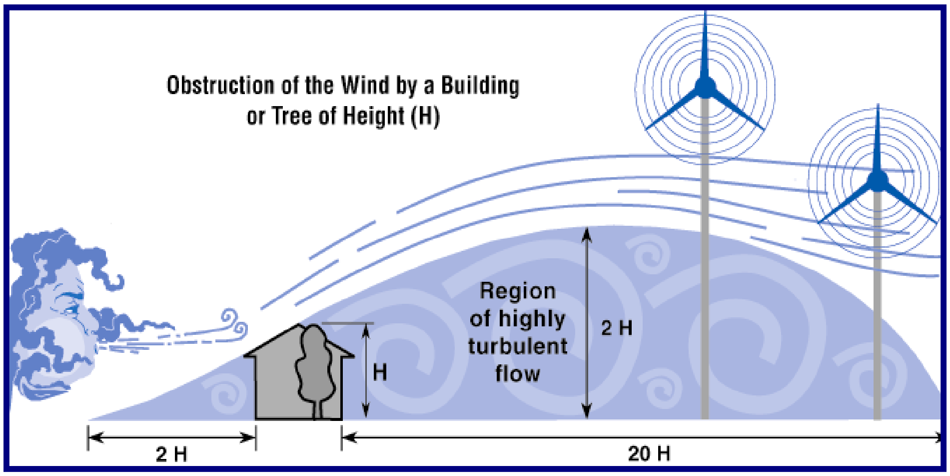


Figure 1: Obstruction Avoidance for Wind Turbines

Turbines are often erected away from structures to minimize the risk of them falling onto buildings during periods of extremely strong winds. The minimum distance between the turbines and the structures is typically equal to the combined height of the tower and blades, known as the fall distance.

D. Utility Line Connections

For net metering and small generation projects, the utility line connections are greatly simplified. With net metering, the point of interconnection is on the customer's side of the meter. This avoids several things that may be required for a commercial generation type of project. As long as the connection is facilitated with an approved interconnection device this is a fast and simple process.

The connection for small projects may be facilitated with available power inverters designed for that purpose or through specific switchgear. Power inverters allow electricity generated by wind turbines to be safely uploaded onto the power grid. Inverters are often designed with stand-alone features to allow a home or business to install batteries for backup power if the grid is down. Switchgear connections are designed to disconnect the generator from the grid if the electric utility is down. This prevents an occurrence known as "islanding" which endangers utility workers attempting to repair the grid while power from distributed generators is still being uploaded to the grid. Switchgear connections typically will not provide any form of backup power.

E. Communications with Neighbors

When developing wind projects, communication with neighbors may or may not be required. Communication helps alleviate concerns and answer questions. Even if not required, communication is a good idea. Newer wind generation technology has increased tower height and rotor diameters, but with significantly reduced noise levels. In fact, the newest technologies, with the larger units of 1.5 MW and greater are almost silent even at the base of the turbine. The larger units turn slowly and are a peaceful, quiet generation device, especially compared to any form of combustion technology.

F. Permitting Checklist

The following list should provide the basic steps to follow in permitting a wind project. The rule of thumb is to make contact early with permitting authorities and find out the specific requirements since so much about a project depends on this:

1. Contact the Appropriate County Planning Department or Permitting Agency.

- Find out if small wind energy systems are addressed by local ordinances and, if so, get a copy.
- Learn the relevant permitting procedures.
- Ask what forms are required, get copies of them and find out what submittal documents will be required. Are you required to submit plans stamped by an Idaho Registered Professional Engineer or will the documentation from the manufacturer and/or dealer suffice?

2. Review Applicable Standards and Restrictions

- Specific Zoning Allowed Use for Property Category
- Minimum Parcel Size
- Minimum or Maximum Tower Heights
- Setbacks
- Noise Levels
- Specific Equipment Certifications
- Building Code Compliance
- Electric Code Compliance
- FAA Requirements
- Other Siting Restrictions

3. Grid Connection Requirements

- Notify Utility and/or Public Utility Commission
- Interconnection Agreement

4. Public Notice Requirements

- Notify Neighboring and Affected Landowners
- Publicize Hearing

5. Comply with Permitting Requirements

- Building Permits and Inspections
- Electrical Permits and Inspections
- Utility Inspection

V. Process for Medium to Large Commercial Projects

There are basically two main strategies for development of commercial projects. The steps are essentially the same, though the extent of each task for smaller projects is greatly reduced compared to the large commercial projects.

Developing your own project

One landowner strategy is to pursue some level of development activities independently or in a partnership with others. This approach may be more risky, requires significantly more time, education, and financial investment, and only makes sense in areas with a strong market for wind energy and a landowner willing to spend the time required to develop the project oneself. With the best wind resources, one can expect to hire professionals with experience in wind development, tax investment, PURPA law, and utility interconnection and power purchase negotiations. The landowner is responsible for the costs of data collection, interconnection and environmental studies, and project consulting fees with the risk that the wind resource may not ultimately be sufficient for economic development. If a good wind resource exists, after the initial assessments, a landowner can begin additional development activities or negotiations with developers for land leases or other agreements from a stronger position of knowing the wind resource, based on an independent analysis.

Working with wind developers

The most common agreement available to a landowner is a land lease with a developer in return for annual payments. Developers often start by signing a land-lease option and then collect wind data, typically for one year, before signing a long-term lease. It is important to note that a land lease with a developer does not guarantee that a project will be built on your land. A developer must have both the financial means to build the project or bring equity capital and the ability to sell the project's output over the long-term to make the project economically viable. If it looks like the site has potential, the developer will install monitoring equipment, pursue power purchase contracts, and initiate other development activities at no cost to the landowner. The risks to a landowner in a land lease are relatively low since the landowner does not have a financial position in the project.

Project development essentially occurs in phases. However, many of these steps can be done concurrently. Some can be accelerated dramatically to take advantage of situational opportunities, such as state or federal benefits:

<u>Phase 1</u> – Data Acquisition & Site Modeling
<u>Phase 2</u> – Feasibility Study Analysis & Business Modeling

Phase 3 – Project Financing Fundamentals:
Grant Applications, Investment Financing, Loans, etc.
Phase 4 – Project Development:
Utility Interconnection Study; Utility Power Purchase Agreement; Environmental Studies; Planning & Zoning Permitting; Supplier and Construction Contract Negotiations.
Phase 5 – Project Management & Property Improvements:
Build Roads; Construct Power Lines, Substation and/or Interconnect Facilities; Install Wind Power Generators; Connect to Grid
Phase 6 – Ongoing Operations & Management:
Power Generation; Data Monitoring; Equipment Maintenance, etc.

A. Data Acquisition – Resource Assessment

Data acquisition requires an initial site assessment of potential wind energy and arranging for the placement and installation of anemometers. The plan for periodic retrieval of the data must be followed and a system for checking the operational status of the anemometers over a period of at least a full year must be developed. The financing of a commercial project requires the best possible data to insure the resource is truly as represented in the feasibility study. Commercial wind turbines typically require a minimum annual average wind speed above 15 mph, or 6.7 meters per second. In many cases, however, an economical project can be developed with less wind.

Anemometer data are typically collected in 10 minute intervals and are required to project the energy output from the site. Average wind speed information is helpful in gauging a site's potential, but won't facilitate accurate estimates of energy output. Larger projects also require anemometer data from taller towers. The closer the anemometer is to the intended turbines' hub height, the better the data. Also, anemometers at two or three elevations on the same tower provide wind shear information that helps predict the wind speed at elevations higher than the anemometer tower. A standard 50 meter anemometer tower recording "commercial investment grade data" has four separate anemometers at three elevations and two wind direction vanes recording data at one location.

Figure 2 shows various manufacturer power curves which indicate different performance. These bands must be taken into consideration when evaluating the energy production from various turbines for a particular site with actual data. Also note the significant energy reduction due to less air density at higher altitudes.

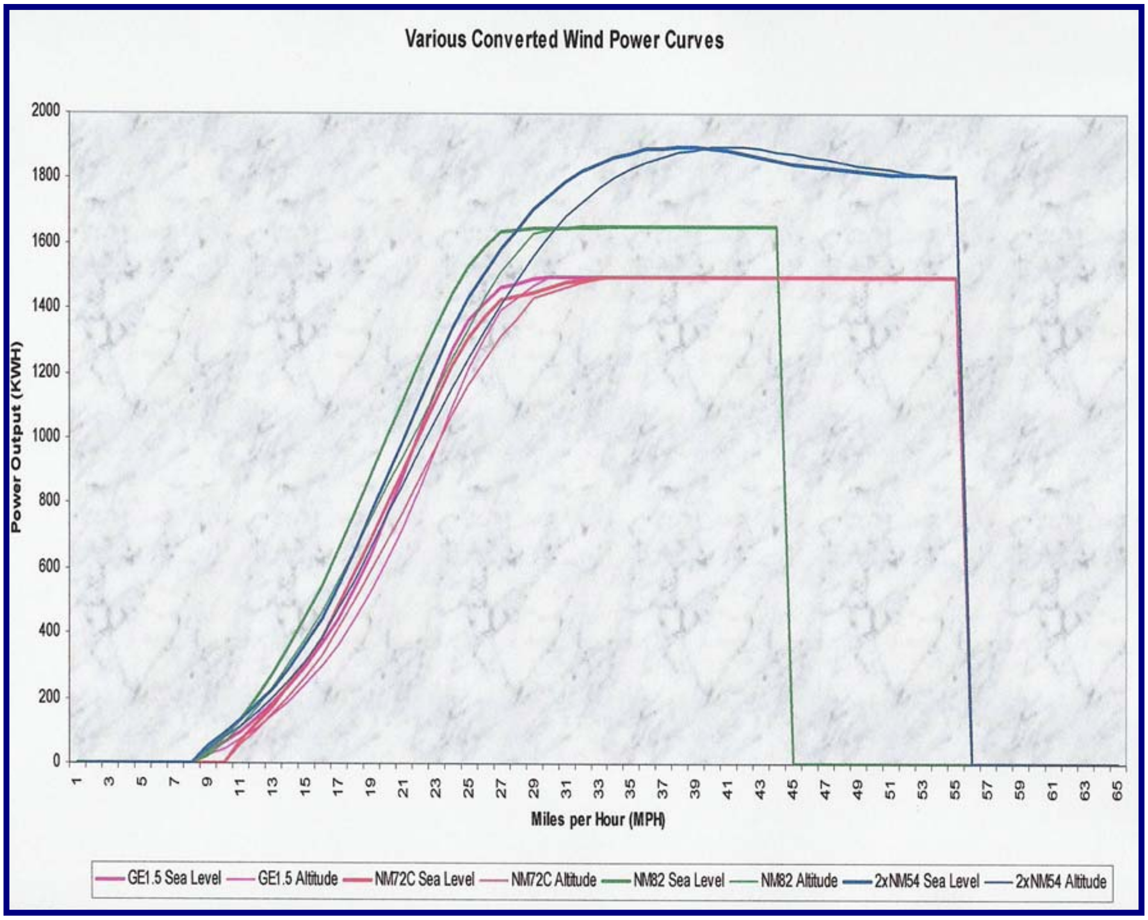


Figure 2: Wind Turbine Power Curves with Altitude De-Rating Curves

B. Requirements Study – Site Evaluation, Feasibility Study, Turbine Positioning

During the requirements study phase of implementation, the overall scope of the project needs to be determined along with a project plan and a preliminary estimate of the cost of the project. The typical duration of this segment can be up to six weeks and necessitate one or more additional site visits. The requirements phase may begin before or after the initialization of data collection and will determine the scope and timing of the project; however, much of this can be finalized after the data logging phase.

The proximity of turbines to electric distribution and transmission lines is another important factor in evaluating the economic viability of a project. Due to the high costs associated with building transmission lines, most wind projects are located within three miles of high-voltage transmission lines. Also, land features (hills and ravines), vegetation, and nearby structures can affect how valuable a site is for wind energy development. In Idaho, high hilltops, relatively free of trees and buildings, are favorable for a wind energy project. Factors such as the accessibility of the land for construction, soil type, and terrain impact construction as well as maintenance needs and costs. Environmental impacts related to view-sheds, noise, birds, wetlands, and historical preservation are crucial to the viability of a project and its community acceptance.

The map in Figure 3 indicates some of the types of information collected during a site survey. It shows features that should be taken into consideration, such as county roads and power lines, as well as general topography.

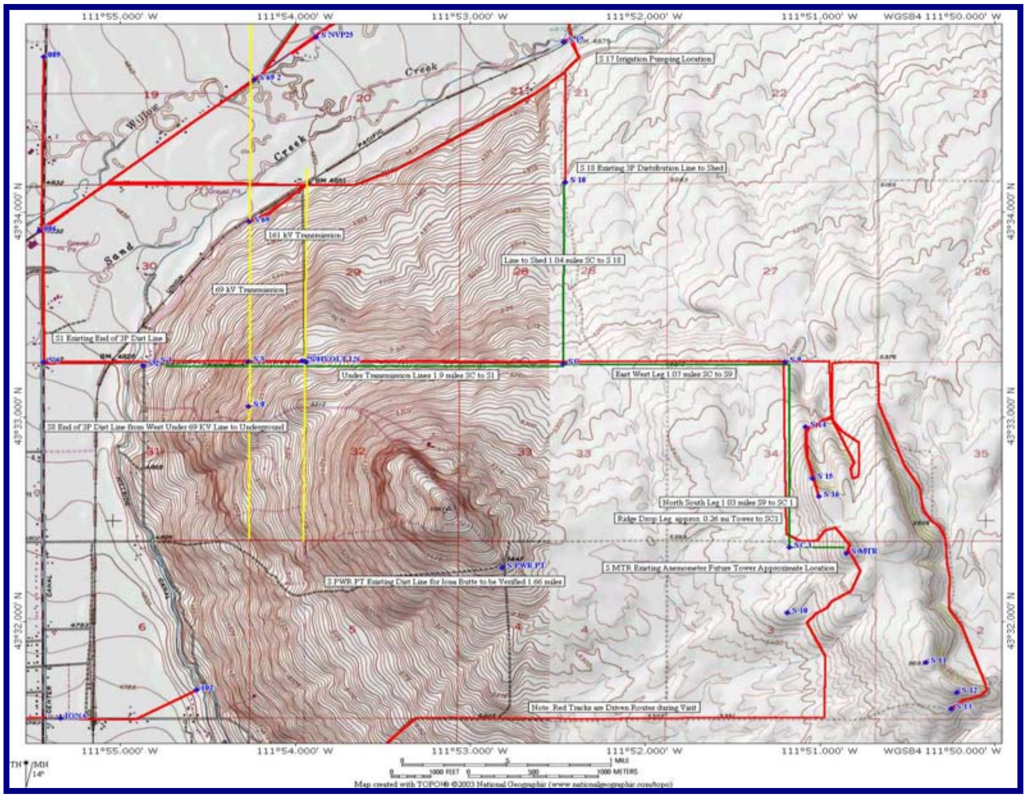


Figure 3: Project Site Map Example with Various Special Notes, Roads and Powerlines

The feasibility study initially includes the assessment of the data and determination of the overall quality of the wind resource. If the data warrant further analysis, this study includes a comparison of different wind generators and an evaluation of the interconnection requirements at the site for the various options to market the energy to the local power company or to sell the power generated to other energy markets. Typical rates and costs are included in this stage to determine if the project is both technologically and financially feasible.

Turbine positioning is more crucial with a large array of turbines than with one or two turbines. Wind turbines may block the wind from each other in some configurations and reduce the project power output. The prevailing wind direction, physical terrain conditions, size of turbines and other parameters must be taken into consideration to optimize the total power output from the project instead of from an individual turbine.

C. Business Planning, System Procurement Arrangements, and Project Financing

This phase will move the project forward by converting the analyzed data into a complete business plan including pro-forma income statement, cash flow, and balance sheet. The business plan may then be presented to individuals, businesses, banks, investment firms, and even may be utilized in applying for government development grants to bring sufficient funding to the project. Financing goals are targeted to maximize the benefit and reduce the risk to the landowner of the wind project. Some landowners may want to finance the project themselves, while others may want to pursue a partnering arrangement to facilitate development.

System procurement activities include negotiations with manufacturers, contractors and bid evaluations. Total coordination of best delivery and project schedule arrangements must be considered as well. Some of the negotiations with the larger items, such as the turbines themselves, can be long and complicated.

Project financing becomes a crucial task in medium wind projects and larger. While a small home project may have significant costs from $6,000 to $40,000, commercial projects often cost several million dollars. A typical cost for a 10 MW project may be $13 to $15 million or more and a 100MW project well over $100 million. The projects need to be financed in a way to take advantage of the available tax credits and other incentives.

As of 2005, the federal tax credits available are approximately $0.018 per kWh along with accelerated depreciation under the Modified Accelerated Cost Recovery System (MACRS) schedule. These credits were extended until 2007 as part of the 2005 Energy Bill, which was signed into law in August 2005. Also designed to help encourage development of renewable energy projects, Idaho House Bill 110 was signed into law on April 12, 2005. This law exempts sales tax on the purchase of machinery or equipment used to generate electricity renewably, including wind projects. To qualify, the projects must generate 25 kW or more of electricity. At this size, most net-metering applications would qualify for the exemption, as would all distributed generation and commercial projects described in Section III, **"Types and Sizes of Project**."

D. Utility Interconnection, System Installation and Commissioning

For medium scale distributed generation and commercial projects the interconnection requires several additional components. The utility must make sure the generation facility is disconnected from the grid in the case of a line fault. The typical minimum requirements include a visible physical disconnect along with the appropriate relays to sense when the generation system should be off the grid.

Larger commercial scale projects are always connected to large high voltage power lines with extensive substations.

Many aspects of system installation can be challenging in some wind site locations, both from physical or political constraints. Each project will need contracts, permits and licenses, and possibly approvals from the local and state governments and utility companies. All of this can be coordinated as part of the actual project construction management. Final project commissioning is an expected closure to the system development to make sure all systems are working as designed.

E. Asset Management – System Operation, Monitoring and Maintenance

One crucial aspect to consider up front is the ongoing management of the project to maintain the revenue stream and keep the facility at its maximum operating potential. A wind project can only produce during the windy times so the cost of being non-operational on a day without wind is nothing. However, the cost of being down during a single windy day could be 1% of the project revenues. Many commercial projects may have a 20 year contract so the facilities need to be managed with a long term prospective in mind.

The capabilities and experience of an asset management team that should be considered include:
• project management and continuing engineering
• project re-engineering and re-design, including retrofits
• financial and risk management, including budget planning and cost control
• contract administration, including power purchase agreements and land lease agreements, equipment/parts procurement and installation
• turbine repair and maintenance service agreements
• preventive maintenance planning and implementation
• staffing and resource management
• performance monitoring and analysis
• continued operation through lifetime of project

VI. County Permits

Counties are in the early stages of figuring out how to deal with wind specifically. The information in this section introduces the types of permits typically required for wind projects. See Section IX, "**Permitting Processes**…." for details on the permitting process in five counties.

A. Conditional Use

The conditional use application is the standard method of permitting wind projects at this time. The premise is that generation of energy with wind turbines may be allowed where it is not specifically prohibited under certain conditions in certain locations. This is the first place to start in putting together a successful project. If a wind project will not be allowed in a certain area, there is no point in collecting data or exploring project options until that hurdle is overcome.

Fortunately counties in Idaho are very supportive of wind projects and seem to be working to make processes easier rather than more restrictive.

B. Building

Building permits are required for the structures pertaining to a wind project in the same manner as other structures around the county. The only problems come from a lack of experience and familiarity with the technology and standard practices in the industry. There are a limited number of installations in Idaho, but it turns out that submittal of standard drawings and plans from the manufacturers and foundation drawings from the experienced contractors and designers has been sufficient.

C. Electrical

Electrical permitting is required. Generation equipment must meet state standards in the installation and operation of the facility.

D. Building Inspection

Building inspection for wind projects is mainly focused on the foundation concrete and anchor design.

E. Electrical Inspection

Electrical inspection is crucial to any generation facility, but is facilitated by the state electrical permitting process.

F. Others

At this time, other types of permitting through the county offices are not anticipated. However, rules and policies change often and it is crucial, as stated elsewhere in this manual, to first contact the appropriate people to find out the current requirements before undertaking any actions in anticipation of developing a wind generation project of any type.

VII. State Permits

A. State Electrical Permit

The state issues a permit which essentially allows a project to be developed according to National Electrical Code (NEC) and Institute of Electrical and Electronics Engineers (IEEE) standards. For a small project at a residence, the homeowner is allowed to do the wiring; however, these projects are not as simple as installing electrical outlets or light switches. Any commercial project must be wired by state licensed electricians. The utility typically will not perform tests or inspections until the installation has passed the state electrical inspection. For applications and information, contact the Idaho Division of Building Safety at:

Electrical Bureau
1090 E. Watertower St.
Meridian, ID 83642
Ph (208) 334-2183
Fax (208) 855-2165
Code & License Info (800) 955-3044
http://dbs.idaho.gov/electrical/permits_inspections.html

B. Idaho Transportation Department, Division of Aeronautics

The Division of Aeronautics is the state agency responsible for air traffic obstruction evaluation. The state rules largely mirror federal rules regarding tall structures, 200-feet or taller. See Section VIII, "**Federal Permits.**" Restricted areas near airports are defined by the Federal Aviation Administration. For structures 200-feet or taller, builders must notify the Division of Aeronautics, aviation technician. The best way to notify the Division of Aeronautics is to simply provide a copy of FAA form #7460-1, which is required for federal permits. The Division of Aeronautics makes lighting and marking recommendations on a case-by-case basis. For more information, contact the aviation technician at:

Idaho Transportation Department, Division of Aeronautics
3483 Rickenbacker St.
Boise, ID 83705
P.O. Box 7129
Boise, ID 83707-1129
Phone: 1-208-334-8775
In-state toll free: 1-800-426-4587
FAX: 1-208-334-8789
http://itd.idaho.gov/aero

VIII. Federal Permits

The Federal Aviation Administration (FAA) has concerns with any structure 200-feet or taller. There are certain restricted areas within the approach and departure areas around airports that have other structural height limits. For structures 200-feet or taller that are not located near airports, registration of the structure and lighting is required. Use **FAA Form #7460-1** to report such structures. For information regarding tower lighting requirements contact the FAA Northwest Mountain Region Office in Renton, Washington.

Federal Aviation Administration, Northwest Mountain Region, Airports Division
1601 Lind Avenue, S.W., Suite 315
Renton, WA 98055-4056
Voice: (425) 227-2600
Fax: (425) 227-1600
http://www.nw.faa.gov

IX. Permitting Processes For Small and Medium Sized Turbines in Five Counties, Including Interviews with People in Those Areas Who Have Gone Through the Process

For Elmore, Jerome, Cassia, Bonneville and Twin Falls counties, interviews were conducted with county planning and zoning officials and developers of wind energy projects.

This information is subject to change, and some is in the process of revision even at the time of printing. Some of this information is the result of personal interviews and as such may be subjective and may not represent the opinion of individual counties or state agencies. As with all projects of this type, anyone seeking to permit a project is advised to check with local authorities to ensure compliance with existing or new requirements.

A. Elmore County

Elmore County has had quite a bit of activity, including a project featuring three Micon 108kW turbines near Highway 84 northwest of Mountain Home.

Table 1: Elmore County zoning information

County Name	Elmore
Appropriate Office	Growth and Development Office 208-587-2142 ext. 269
Specific Ordinance or Conditional Use Permit	Specific ordinance is being developed. Until it is completed, Conditional Use Permits (CUPs) are required.
Tower-height limit	40-feet to 80-feet, depending on zoning
Tower-height variance	Apply for variance along with CUP
Building permits	Only apply to buildings, not to towers or turbines
Building inspection	Not applicable unless building permit is required
Process to obtain permits	Request CUP and variance applications from the Elmore County Growth and Development Office; the applications can be sent via U.S. mail or email. The county will schedule a hearing and notify appropriate property neighbors.
Timeline	Allow 6 weeks after complete and accurate application and fees are submitted to the county
Costs and fees	$20 for zoning permit $250 for CUP $200 for variance

Dan Hennis Example:

Dan Hennis had the first "wind farm" in Idaho if you count the three very small turbines operating at one time, though currently he has just one small wind generator up and running. The total output of those three units was 3900 watts at rated wind of 13 mph, though at high winds it might have been more like 5000 watts. Only the 500 watt Sensenbaugh turbine is still up, but he had a 3000 watt Whirlwind and an Airfoil 3 rated at 400 watts. He's currently rebuilding the Airfoil and upgrading the power capacity to 825 watts. His installation is a net-metering example with Idaho Power Company. He didn't have trouble with Planning and Zoning, but had a hard time working out the last details with Idaho Power for the connection. It seems his Trace inverter didn't have the required stamp because of the date he ordered it. He had to send it back to the manufacturer so it could send him a new one with the right label. Idaho Power was going to charge him $400 for that but in the end simply did it free of charge to help him get connected. He then spent nine hours re-wiring it.

Figure 4: Dan Hennis' 500-W wind turbine

Mr. Hennis has recently completed a new home and intends to install a 25-kW turbine with the home since he enjoys working with the wind so much.

Bob Lewandowski Example:

The late Bob Lewandowski had the first truly commercial wind farm in Idaho. Built near the freeway between Mountain Home and Boise, it has gotten a lot of attention from the public as a very impressive installation though it also is still quite small by industry standards at 324-kW total power. Mr. Lewandowski was a pioneer in going through the processes himself and getting the turbines up and running. He purchased used units and completely refurbished them. He also redesigned the towers, doubling their original height and adding guy wires so he could tip the towers down to service the turbines without a crane. The three turbines are Micon 108 kW units on about 160' towers. He bought the decommissioned turbines from a wind farm in California and transported them to Idaho himself. He spent years working on this project and advised everyone to start early and "do your homework up front." He also said it is crucial to "know your wind resource before you start." He has given numerous public presentations and was well known in the wind industry in Idaho.

When he initially started the permitting process, Mr. Lewandowski felt like he was inventing it. Every stage of development required a tremendous effort for the first turbine; however he emphasizes that the second and third turbines were relatively easy once he was following the permits and pattern he established. The conditional use permit he received actually allows a total of 13 turbines at that site so each additional turbine simply requires a building permit once the unit is ready to erect.

Figure 5: Bob Lewandowski's three 108-kW wind turbines

One of the initial setbacks Mr. Lewandowski faced in getting his conditional use permit was that the county forgot to require the height variance in his original application. After he had scheduled the hearing and notified his neighbors and gone through all of those requirements, he had to repeat the entire process with the height variance included. In total that process took about six months of time to get everything done and approved at the actual planning & zoning hearing. The key requirement was to put solid red lights on the towers, not strobe lights for night illumination and his height restriction was limited to 200' to the tops of the blades. He had no problems with the Federal Aviation Administration and the National Guard attended the hearing and supported his project at the height he proposed. The electrical inspection and permit dealt only with the electrical part of the turbines and inspecting up to the grid connection. The building permit and inspection is attached to the foundation design and implementation only. The rest of the project, including the tower and the turbine, consists of operating equipment at the site. Permits are not required for operating the turbine just as permits are not required for operating a lathe in a machine shop. Due to the design changes to the tower and foundation, Mr. Lewandowski was required to do a complete engineering analysis. The entire system was certified by a professional engineer for the county permit application. Mr. Lewandowski noted that the cables used as guys for his towers are rated at 100 tons and the anchors are rated at 80 tons which is far beyond their loading.

Bob Lewandowski built his wind farm one turbine at a time and completing the project was a substantial achievement. Initially he sold the energy under a schedule tariff to Idaho Power at below market rates. The Schedule 86 rate paid for such energy is currently set at 15% below the Mid-Columbia spot market for the Northwest, which is the primary price at which Idaho Power buys extra energy. Since the energy is generated and delivered to the utility grid on its system instead of being delivered across state boundaries on high voltage transmission lines, Mr. Lewandowski points out the utility really should pay more than the Mid-C price if that value were truly taken into consideration. It took several months after the erection of the last turbines to finally get a contract with Idaho Power to sell the energy ultimately under a PURPA Qualifying Facility contract agreement.

B. Jerome County

Jerome County requires any installation above 35 feet to secure a variance and conditional use permit. These are both secured with one application and hearing. Officials suggest permitting as much of the project as intended for the future even if perhaps only one turbine will be installed initially. There is only one wind project in the county. Officials are interested in an ordinance to permit projects but are concerned about the impacts a specific ordinance may have. The primary concerns at this time are with engineered foundation designs and making sure the turbines wouldn't be sited in a way to fall on neighboring property.

Table 2: Jerome County zoning information

County Name	Jerome
Appropriate Office	Planning and Zoning, 208-324-9263
Specific Ordinance or Conditional Use Permit	Special Use Permit (SUP) is required (similar to a Conditional Use Permit)
Tower-height limit	35-feet
Tower-height variance	Apply for variance along with SUP
Building permits	Required
Building inspection	Required
Other permits	Road Access permit from the Highway District for new access. If the new road is longer than 150', it must be a Fire Access Road.
Process to obtain permits	Request SUP and variance applications from the Jerome County Planning & Zoning Office. Complete and return applications.
Timeline	Allow 45-60 days for SUP. Allow 2-5 days for building permit.
Costs and fees	$105 for SUP plus public legal notice (in newspaper). Building permit fees vary, based on valuation.

<u>Dennis Myers Example:</u>

Dennis Myers has a single Jacobs 20kW turbine installed on an 80 foot tower near his home. This is a net-metering project with Idaho Power Company. Originally, he permitted for three turbines in his conditional use, but has only installed one. Mr. Myers has had this unit connected for two years. His house has natural gas heat, though he has larger electrical air conditioning loads in the summer. After two years he has a net credit of $300 on his utility bill and has never cashed out his account with Idaho Power. His biggest issue with permitting was that no one knew what he should have to do. The biggest frustration was paying $500 for an Idaho Professional Engineer to stamp the factory blueprints for the foundation and tower design. The engineer told him with so much concrete he wouldn't even have to bury the foundation to keep the tower from falling over. His home is 300 feet from the turbine and his closest neighbor is 1000 feet away. If everything is quiet he said he can barely hear the turbine noise at his house, but if the refrigerator comes on or someone talks, he can't hear it. Conversely, he said you can hear the train whistle in Shoshone 9 miles away. Mr. Myers said he had to send letters to everyone within two miles and put notice in the local paper for his conditional use meeting, but no one opposed the project and people congratulated him for breaking new territory. Even now people commend him for doing something new, and his turbine has become a local reference landmark. If he did it over again he said he would use a 120 foot tall tower since there is more wind up higher – he feels he might gain as much as 30% more output, though without anemometer data on actual wind shear that is only a guess.

Figure 6: Dennis Myers' 20-kW wind turbine (photo by G. Fleischman)

C. Cassia County

Cassia County permits wind turbines by going through the standard conditional use application process. The Planning and Zoning commissioners meet each two weeks and the application is prepared and submitted to be reviewed at the meeting. No permitting was required for the anemometer as a temporary structure. The wind generation equipment is permitted in the Agricultural zones with conditional use permitting but requires a variance to be installed in the Residential Agriculture zones.

Table 3: Cassia County zoning information

County Name	Cassia
Appropriate Office	Planning & Zoning 208-878-7302
Specific Ordinance or Conditional Use Permit	Conditional Use Permits (CUPs) are required.
Tower-height limit	No specific limit
Tower-height variance	Not applicable
Building permits	No
Building inspection	No
Process to obtain permits	For Conditional Use Permit, apply to county. The county will notify appropriate property owners, make public notices and schedule public hearing. Site plans and construction drawings must be submitted to the county for the building

	permit.
Timeline	Allow 60 days at least
Costs and fees	$150 fees for CUP. Building permit fees vary, based on construction valuation.

<u>LeRoy Jarolimek Example:</u>

Figure 7: LeRoy Jarolimek's 20-kW wind turbine

LeRoy Jarolimek successfully permitted a 20 kW Jacobs net metering turbine near Burley Butte in Cassia County in 2003 and finished the installation in June of 2004. His story is quite simple in that he had no trouble in the process itself. He secured the conditional use form and filled it out with the project description and property location. He prepared maps of the location and assembled a package including information about the specific Jacobs turbine and tower he intended to install as well as facts about noise output from wind turbines. He felt it was important to present as complete of a package as possible to minimize any opposition or points of concern. He submitted the application and information package with the $150 fee. He was required to mail notices of the hearing to property owners within ½ mile of the site and posted notice in the newspaper about the hearing once per week for three weeks before the hearing. After approval at the hearing he had to wait 30 days for final approval during the appeal period. After all of this was done, Mr. Jarolimek said it was really a simple process and went well.

Another project for a similar turbine in Cassia County has taken months and is in various stages of appeals. That project is in a Residential Agriculture zone and as such requires a variance. At first this project looked like it would be approved, but it seems one neighbor in particular has taken a crusade to prevent the turbine from being installed. The homeowner is struggling to get past such opposition. After serious legal expenses, it is uncertain whether that project will ever proceed, so be careful to follow the exact county requirements precisely and work closely with neighbors early in the process.

Mr. Jarolimek has also applied for and received the appropriate conditional use permitting and has gone through the early planning stages for a 10.5 MW wind project. It is planned for the same farm area approximately ½ mile west of the existing Jacobs turbine.

D. Bonneville County

Bonneville County also simply requires a conditional use application to permit a wind project. As with other counties, officials recommend permitting a multiple turbine project through the conditional use even if a smaller project is anticipated as the first phase.

Table 4: Bonneville County zoning information

County Name	Bonneville
Appropriate Office	Planning and Zoning 208-524-7920, ext 3
Specific Ordinance or Conditional Use Permit	Conditional Use Permit (CUP) is required
Tower-height limit	No specific limit
Tower-height permit	Apply for permit along with CUP
Building permits	Required
Building inspection	Required
Other permits	No
Process to obtain permits	Request CUP and variance applications from the Bonneville County Planning & Zoning Office. Complete and return applications. A use hearing will be scheduled. For a building permit, submit plans for review and compliance with building code.
Timeline	Allow 3 to 4 months for entire process
Costs and fees	Fees for use hearing vary, depending on the number of public notices required. Building permit fees vary, based on valuation.

Figure 8: Schwendiman Wind Project Site and Anemometer Installation

Schwendiman Wind Example:

Tyler Schwendiman went through the permitting process in 2003 for a single 1.5 MW turbine and again in 2004 for multiple turbines at the same potential wind site. Once the conditional use is granted, specific building permits are required for the actual facilities to be constructed on the site pertinent to the description filed in the conditional use application. Thus, the property is now approved to install a wind farm at that location which fits the general size and description as submitted in the application. The second conditional use application was filed to expand the scope of the original small distributed generation project originally planned. The hearing was one month after Ridgeline Energy had a public hearing in Bonneville and Bannock Counties for a large commercial project east of Idaho Falls. No one testified against this large project in either of the county public hearings and dozens of people testified in favor of this project specifically and in favor of wind projects in general. At the two hearings Tyler Schwendiman took part in, no one testified against the project. He had filled out the conditional use form and went through the same process for the turbine as he had for the anemometer tower put up several years previously. The main information submitted consisted simply of some mapping to depict the project location and layout as well as overall descriptions of the intended wind turbines, power lines, and potential substation information. Specifics of all of this equipment will be required for building permits, but only general descriptions, types and sizes were required for the conditional use.

Ridgeline Energy Goshen Wind Power Project Example:

Ridgeline Energy LLC (of Idaho Falls and Boise) teamed up with Airtricity Inc. (of Ireland) to apply for conditional use in Bonneville and Bannock counties for a very large wind project encompassing about 30,000 acres of contracted land. These 60 total acres are anticipated to be utilized specifically by the first 100 MW for turbines and roads. The most significant aspect of the public hearings in both counties was that there was no opposing testimony whatsoever. This project is under construction as of press time.

E. Twin Falls County

Twin Falls County has seen the most growth in wind farms over the past year. The 10.5MW Fossil Gulch Wind Park went online in January of 2005. In June 2005 four additional 10.5MW wind parks were approved by the county to be built in the Bell Rapids area near Fossil Gulch. Those four wind parks are scheduled to be completed by the end of 2005.

Table 5: Twin Falls County zoning information

County Name	Twin Falls
Appropriate Office	Planning and Zoning Administration 208-734-9490, ext 4
Specific Ordinance or Conditional Use Permit	Conditional Use Permit (CUP) is required
Tower-height limit	35 feet
Tower-height permit	Included in the CUP
Building permits	Required
Building inspection	Special inspection by professional engineer is required
Other permits	100-foot setback from any canyon rim is required. If the "rim" is unclear a survey is required.
Process to obtain permits	For Conditional Use Permit, apply to county. The county will notify adjacent property owners within 300-feet, make public notices and schedule public hearing. Applications are available online at www.twinfallscounty.org/pz/new/CU.102003.pdf
Timeline	For Conditional Use Permit, four (4) months from receipt of completed application. For building permit, one (1) additional month.
Costs and fees	$250 for Conditional Use Permit. Cost for building permits ranges from $500 - $700 depending on size of foundation.

Fossil Gulch Wind Park Example:

The 10.5MW Fossil Gulch Wind Park, located in the Bell Rapids area west of Hagerman, was completed and operational in January of 2005. It consists of seven 1.5MW GE wind turbines, with 80 meter (262 feet) towers and 77 meter diameter blades. The total height is about 119 meters (390 feet) when the top blade is vertical.

Fossil Gulch was developed by Exergy Development Group of Montana. James Carkulis, president of Exergy Development, indicated that the permitting process was relatively quick and simple. A Conditional Use Permit was granted with little public comment or opposition.

Figure 9: Construction Photo of Fossil Gulch Wind Farm with 300 ton crane

Figure 10: Two of the seven 1.5MW wind turbines at Fossil Gulch Wind Park

<u>Other Bell Rapids Area Wind Parks:</u>

In June of 2005 Exergy Development Group received approval to construct four additional 10.5MW wind parks in the Bell Rapids area. Each of these parks will be similar to Fossil Gulch, with seven 1.5MW GE turbines.

According to Mr. Carkulis, the permitting process for these four wind parks was not as easy as the process for Fossil Gulch. Several local residents and the superintendent of the

Hagerman Fossil Beds National Monument testified at the public hearing, citing concerns about the visual impact of Fossil Gulch and the anticipated visual impact of the four new parks. Conditional Use Permits were granted for each of these wind parks.

Several other landowners in Twin Falls County are in the various stages of anemometer data collection, site evaluation, utility interconnection evaluation and the county conditional use permitting processes. They are looking to build commercial scale wind farms in the area to take advantage of the steady winds and provide other sources of farm revenue.

F. Additional Examples

Lee Pittman Example – Post Falls Idaho

Lee Pittman has an older Carter 22kW turbine installed on an 80 foot tubular steel tower. It is connected through a utility net metering project with Avista and has been running since 2001. He said Avista was surprisingly cooperative and helpful. The unit is an induction machine and is connected to the utility with a lockable visible disconnect straight to the utility connection at his home with a 125 Amp 240 volt circuit breaker. He said his process with Planning and Zoning was bureaucratic and painful in many ways but through perseverance he got it done. He attributed the difficulty, like so many of the other Idaho wind project examples, to being the first one in that county. As with most people who have systems in place today, this was done because of a passion for wind energy. The turbine came from a California wind farm where it had run for 20 years. It had survived many intense storms and earthquakes and then he said the county wanted him to "prove it wouldn't fall down." He couldn't get the factory blueprints and so he had to pay an Idaho professional engineer to draft some drawings and stamp them for the P&Z department. This older rebuilt unit is much noisier than the Jacobs designs, he says. You can hear the older gearbox and a low frequency buzz though none of his neighbors on adjoining 5 acre parcels has complained. He pointed out that the rural areas of Idaho have always had wind machines and particularly the windy zones where people are now again looking to install new units. People were completely accepting of traditional windmills as part of the natural landscape and he feels they should be as accepting of newer turbines.

Figure 11: Lee Pittmon's 22-kW wind turbine

Mr. Pittmon has moved and he has sold the turbine. He intends to install a stand-alone energy system including a smaller wind turbine and inverter at his new home in the forest of northern Idaho.

X. Notification of Utilities

The key to integrating a wind project is to facilitate the project in coordination with the local utility. For smaller net metering applications, this requires a standard application process. Each utility has slightly different rules and procedures and tariffs. Idaho Power currently has a net metering tariff which allows up to 25 kW for a residential net metering application and up to 100 kW on a commercial meter. Avista Utilities, with service territory in northern Idaho, offers net metering on a first-come, first-served basis, until the cumulative net-metering generating capacity equals 1.52 MW. Utah Power & Light, with service territory in eastern Idaho, has a net metering tariff which allows up to 25 kW for a residential net metering application and up to 100 kW on a commercial meter; enrollment is limited to 0.1% or the company's 2002 Idaho peak demand.

Larger wind projects beyond net metering require an interconnection application as the first part of the process. This application requires a fee along with the application for the utility to do an initial feasibility analysis to determine if the project can reasonably supply energy to the grid at that location. Each utility has different procedures and fees. The utilities can be contacted at the addresses listed at the end of this document.

XI. American Wind Energy Association Recommendations

The information in this section was obtained from the American Wind Energy Association (AWEA). The AWEA website (www.awea.org) is intended to assist public officials in developing zoning ordinances for wind turbine projects.

A. A model zoning ordinance

AWEA Model Zoning Ordinance:

Permitted Use Regulation for Small Wind Turbines

Section 1 Purpose: It is the purpose of this regulation to promote the safe, effective and efficient use of small wind energy systems installed to reduce the on-site consumption of utility supplied electricity.

Section 2 Findings: The [city or county] finds that wind energy is an abundant, renewable, and nonpolluting energy resource and that its conversion to electricity will reduce our dependence on nonrenewable energy resources and decrease the air and water pollution that results from the use of conventional energy sources. Distributed small wind energy systems will also enhance the reliability and power quality of the power grid, reduce peak power demands, and help diversify the State's energy supply portfolio. Small wind systems also make the electricity supply market more competitive by promoting customer choice.

The State of __________ has enacted a number of laws and programs to encourage the use of small-scale renewable energy systems including rebates, net metering, property tax exemptions, and solar easements. [as appropriate] However, many existing zoning ordinances contain restrictions, which while not intended to discourage the installation of small wind turbines, that can substantially increase the time and costs required to obtain necessary construction permits.

Therefore, we find that it is necessary to standardize and streamline the proper issuance of building permits for small wind energy systems so that this clean, renewable energy resource can be utilized in a cost-effective and timely manner.

Section 3 Definitions:

<u>Small Wind Energy System:</u> A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than 100 kW and which is intended to primarily reduce on-site consumption of utility power.

<u>Tower Height:</u> The height above grade of the fixed portion of the tower, excluding the wind turbine itself.

Section 4 Permitted Use: Small wind energy systems shall be a permitted use in all zoning classifications where structures of any sort are allowed; subject to certain requirements as set forth below:

4.1 <u>Tower Height:</u> For property sizes between ½ acre and one acre the tower height shall be limited to 80 ft. For property sizes of one acre or more, there is no limitation on tower height, except as imposed by FAA regulations.

4.2 <u>Set-back:</u> No part of the wind system structure, including guy wire anchors, may extend closer than ten (10) feet to the property boundaries of the installation site.

4.3 <u>Noise:</u> Small wind energy systems shall not exceed 60 dBA, as measured at the closest neighboring inhabited dwelling. The level, however, may be exceeded during short-term events such as utility outages and/or severe wind storms.

4.4 <u>Approved Wind Turbines:</u> Small wind turbines must have been approved under the Emerging Technologies program of the California Energy Commission or any other small wind certification program recognized by the American Wind Energy Association.

4.5 Compliance with Uniform Building Code: Building permit applications for small wind energy systems shall be accompanied by standard drawings of the wind turbine structure, including the tower, base, and footings. An engineering analysis of the tower showing compliance with the Uniform Building Code and certified by a licensed professional engineer shall also be submitted. This analysis is frequently supplied by the manufacturer. Wet stamps shall not be required.

4.6 Compliance with FAA Regulations: Small wind energy systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

4.7 Compliance with National Electric Code: Building permit applications for small wind energy systems shall be accompanied by a line drawing of the electrical components in sufficient detail to allow for a determination that the manner of installation conforms to the National Electrical Code. This information is frequently supplied by the manufacturer.

4.8 Utility Notification: No small wind energy system shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

B. Best practices for counties

Recommended Practices for County Officials

Below are some general rules for designing effective zoning ordinances for small wind energy systems. These recommendations are based on the experiences of turbine owners and counties in California, which passed a law in 2001 that standardizes local permitting restrictions on small turbines. The comprehensive guide Permitting Small Wind Turbines: Learning from the California Experience, offers more information for turbine owners and local officials seeking to understand and improve permitting regulations affecting small wind energy systems.

The Do's:	The Don'ts:
• Remember that small wind turbines reduce the threat of blackouts in your community, contribute to national security, and reduce dependence on polluting forms of electric generation. Small wind turbines are community assets, not toys or hobbies.	• Don't supersede FAA lighting requirements. Small wind turbine towers are usually below heights regulated by the FAA or state aviation law.
• Make sure that your fee structure isn't discouraging potential wind turbine buyers. Ideally, total permitting costs should not exceed two percent of the original capital cost of a small wind turbine.	• Don't require all small wind turbine applicants to obtain a conditional use permit. Instead, create a permitted use designation with appropriate requirements and restrictions.
	• Don't arbitrarily prohibit wind turbines on all ridgelines. Consider the particular merits of individual sites.

• Review California's Assembly Bill 1207 (passed in 2001) for guidelines on height restrictions, setbacks, and other zoning rules. • Consider whether the rural character of your county justifies tower heights that exceed California's minimum height allowances (See "San Bernardino County," above). • Review design integrity of wind turbine towers, with standard drawings and an engineering analysis showing compliance with national or state building codes and certified by a licensed professional engineer. • Identify a model project to set a high standard for future applicants and to prepare staff to address misconceptions about small wind turbines.		• Don't require that all small wind turbines "blend in with their environments." Require such mitigation only when there is a clear public benefit. • Don't require consumers to post a bond or performance security for removal of small wind turbines. No such obligation is required for any other type of privately financed infrastructure. • Don't require fencing unless public safety is an issue of particular concern at a given site, or unless similar fencing is required for other similar types of structures (cell phone or amateur radio towers).

Source: American Wind Energy Association's Small-Wind Toolbox
http://www.awea.org/smallwind/toolbox/IMPROVE/zoning.asp, accessed 7/26/2004

XII. Wind Glossary

Anemometer – An instrument used to measure the velocity of the wind.

Capacity Factor – The percentage equivalent operation of a project over time based on the total annual energy output divided by the total possible energy output if that facility operated at nameplate capacity for all of the hours in a year.

Cut-in Speed – The wind speed at which the turbine begins to produce electricity. Blades may rotate at speeds lower that this.

Cut-out Speed – The wind speed at which the turbine will turn out of the wind in order to protect itself from damage.

Grid – A network of power lines or pipelines used to move energy.

Kilowatt (kW) – A unit of power equal to 1000 watts. Electric motors and wind machines measure their capacity in kilowatts. 746 watts = 1 horsepower.

Kilowatt-hour (kWh) – A unit of energy. One kilowatt-hour is the equivalent of ten 100-watt light bulbs left on for one hour. The utilities pay and charge by the kilowatt-hour.

Megawatt (MW) – A unit of power equal to one million watts or 1000 kilowatts.

Renewable energy – Energy derived from resources that regenerate or, for all practical purposes, cannot be depleted. These include geothermal energy, solar energy and wind energy.

Turbine – A device that converts the flow of a fluid into mechanical motion that in turn produces electricity. Turbines may be driven by various fluids, including wind, water, steam, etc.

Watt (W) – A unit of power; a rate of energy per time. To calculate energy one multiplies the number of watts (energy/time) by time. For example, to calculate kilowatt-hours (unit of energy), one multiples kilowatts (unit of power) by hours.

Wind Turbine – A turbine that uses wind as its driving force.

Wind Power Class – A classification system that rates the quality of the wind resource in an area based on the average annual wind speed. The scale ranges from 1 to 7, with 1 representing the poorest wind energy resource.

Wind Power Density – A classification system that measures the amount of power contained in a given area for conversion by a wind turbine. Measured in watts per square meter.

XIII. List of references and resources

DISCLAIMER: Links are provided to sites that appeared to provide information, present additional perspectives, or lead to further discussion on this or related topics. Please note that listing here does not necessarily imply verification of information, endorsement or agreement with statements or opinions presented on the listed sites.

A. Websites: Key National and Idaho Specific Websites

- **Idaho Energy Division** – Energy Office Wind Site – www.idahowind.org
- **Idaho National Laboratory INL –** Wind Site - www.inl.gov/wind/idaho
- **Windpowermaps –** www.windpowermaps.org
- **American Wind Energy Association** - www.awea.org
- **American Wind Energy Association's Frequently Asked Questions** - www.awea.org/faq
- **National Wind Technology Center** - new wind energy developments in the U.S. - www.nrel.gov/wind
- **Windustry -** A non-profit wind energy information organization - www.windustry.com/
- **National Wind Coordinating Committee -** supports the development of environmentally, economically, and politically sustainable commercial markets for wind power - www.nationalwind.org

B. Publications and Relevant Specific Documents

- **Wind Energy Atlas –** http://rredc.nrel.gov/wind/usmaps.html
- **US Wind Maps –** www.nrel.gov/wind/usmaps.html
- ***"Permitting of Wind Energy Facilities"*** Handbook available to order from NWCC website. – www.nationalwind.org
- **Small Wind Electric Systems, An Idaho Consumer's Guide –** www.nrel.gov/docs/fy02osti/31466.pdf
- **US Department of Energy, "Wind Information at a Glance"** - www.eia.doe.gov/cneaf/solar.renewables/renewable.energy.annual/chap05.html
- **Danish Wind Turbine Manufacturers Association -** www.windpower.dk - a comprehensive texbook on wind energy, including several wind energy calculators, a quiz, a picture gallery, a wind energy reference manual, extensive statistics, and a FAQ
- **Wind Power Monthly** - www.windpower-monthly.com - late breaking news from the world of wind.

C. National Agencies and Incentive Programs

- **National Database of State Incentives for Renewable Energy (DSIRE)** - www.dsireusa.org - provides a constantly-updated database of information from the 50 states on financial and regulatory incentives for all renewable energy systems.
- **National Renewable Energy Laboratory's Picture Archive** - www.nrel.gov/data/pix/pix.html - pictures
- **Renewable Energy Analysis Studies Network (REASN)** - www.nrel.gov/reasn - an interactive web site that offers the latest in renewable energy analysis. There are Reports, Tools, Data, and Links for Biomass, Geothermal, Solar (thermal and electric) and Wind, as well as crosscutting analysis; event calendars, file sharing, discussion groups and real-time chats.
- **Renewable Energy Technology Screening Software** - retscreen.gc.ca and eosweb.larc.nasa.gov/sse - Natural Resources Canada (NRCan), in collaboration with the U.S. National Aeronautics and Space Administration, has developed software to quickly assess or "screen" the cost-effectiveness of renewable energy technologies (RETs). With a link to a NASA database, RETScreen users have access to such satellite weather data as the amount of solar energy striking the surface of the earth, global temperatures and wind speeds.
- **U.S. Department of Energy's Energy Efficiency and Renewable Energy Network** - www.eren.doe.gov
- **U.S. Department of Energy's Wind Energy Program** - www.eren.doe.gov/wind
- **U.S. Department of Energy (DOE) and Electric Power Research Institute (EPRI) Renewable Energy Technology Characterizations** - www.eren.doe.gov/power/techchar.html - the best estimates of USDOE and EPRI

regarding technical and economic status and future performance and cost of renewable energy technologies through the year 2030.

- **California Energy Commission** - www.energy.ca.gov/wind - Wind energy information, including reports such as the Wind Performance Reporting Summary for 2000-2001, www.energy.ca.gov/wind/documents/2000-2001_wprs_report, which includes descriptions and photos of a large number of wind turbines.
- **Energy Education Resources: Kindergarten Through 12th Grade -** www.eia.doe.gov/bookshelf/eer/kiddietoc.html - the US Department of Energy's list of free or low-cost energy-related educational materials available from a variety of sources.

D. Nonprofit organizations

- **Wind Industry Organization –** www.windustry.org
- **National Wind Coordinating Committee –** www.nationalwind.org - consensus based collaborative endeavor includes representatives from electric utilities, state legislatures, state utility commissions, consumer advocacy offices, wind equipment suppliers and developers, green power marketers, environmental organizations, and local, state, tribal, regional, and federal agencies.
- **Electric Power Research Institute** www.epri.com
- **Synergy Corporation** - solstice.crest.org/renewables/synergy - wind farm projects worldwide
- **EcoNet Energy Resources - Wind** - www.igc.apc.org/energy/wind.html - links to other wind-related sites
- **Union of Concerned Scientists** - www.ucsusa.org - working for a healthier environment and a safer world
- **Worldwide Wind Energy Resources** - lx55.afm.dtu.dk/wind - wind energy developments worldwide.

E. Idaho Public Utilities Commission and Investor Owned Utility Companies

Idaho Public Utilities Commission
472 W. Washington, Boise 83702
(208) 334-0300
http://www.puc.idaho.gov

Idaho Power Company
1221 W. Idaho St., Boise, ID 83702.
208-388-2200
http://www.idahopower.com

Pacificorp – Utah Power and Light
825 NE Multnomah, Portland, OR 97232
888-221-7070
http://www.utahpower.net

Avista Utilities
1411 E. Mission Ave.
Spokane, WA 99252-0001
800-227-9187
http://www.avistautilities.com

F. Idaho Municipal and Rural Electric Cooperative Utility Service Areas

Member Coop/City Name	Address	Telephone
City of Albion Donald Danner*	P. O. Box 147 Albion, ID 83311	208-673-5352
City of Bonners Ferry Stephen Boorman sboorman@coldreams.com	P. O. Box 149 Bonners Ferry, ID 83805	208-267-0357
City of Burley Dile Monson, Mgr.* mmitton@pmt.org	P. O. Box 1090 Burley, ID 83318	208-878-2256
Curt Mendenhall bdl1999@cableone.net	737 Berkley Ave. Burley, ID 83318	208-678-0971
Clearwater Power Company Dave Hagen, Mgr. dhagen@clearwaterpower.com	P. O. Box 997 Lewiston, ID 83501	208-743-1501 208-743-1501
Tom Hutchinson* goldwing@camasnet.com	Route 2, Box 61 Craigmont, ID 83523	208-924-5910
Fall River Rural Electric Dee Reynolds, Mgr.* dreynolds@frrec.com	1150 North 3400 East Ashton, ID 83420	208-652-7431
Tom Atchley toma@fretel.com	P. O. Box 167 Ashton, ID 83420	208-745-7711
City of Heyburn George Anderson, Mayor.* heymayor@pmt.org	P. O. Box 147 Heyburn, ID 83336	208-679-8158
Idaho County Light & Power Jake Eimers, Mgr.(Pres.) jeimers@iclp.coop	P. O. Box 300 Grangeville, ID 83530	208-983-1610
John Solberg*	HCR 11, Box 84A Kamiah, ID 83536	208-935-2950
City of Idaho Falls Mark Gendron, Mgr.* mgendron@ifpower.org	P. O. Box 50220 Idaho Falls, ID 83405	208-529-1430

Inland Power & Light Co. Kris Mikkelsen, Mgr.*	P. O. Box 4429 Spokane, WA 99202	509-747-7151
Kootenai Electric Cooperative Bob Crump, Mgr. bob.crump@kec.com	P. O. Box 278 Hayden, ID 83835	208-772-4781 or 208-292-3207
Ed Gossett (Vice Pres) * egossett@kec.com	P. O. Box 278 Hayden, ID 83835	208-689-3983
Lost River Electric Coop Richard Reynolds, Mgr.* richard@lrecoop.com	P. O. Box 420 Mackay, ID 83251	208-588-3311
Merlin Waddoups	Route 1, Box 99 Moore, ID 83255	208-588-3311
Lower Valley Energy James Webb, Mgr. jrwebb@lvenergy.com	P. O. Box 188 Afton, WY 83110	307-885-3175
Fred Brog* brogfamily@yahoo.com	16644 Stateline Rd Freedom, WY 83120	307-883-2363
Northern Lights, Inc. Jon Shelby, Mgr. jon@norlight.org	P. O. Box 310 Sandpoint, ID 83864	208-263-5141
Orin LaRitchie olaritchie@imbris.net	PO Box 341 Careywood, ID 83809	(208) 683-3221
City of Plummer Donna Spier, Clerk* Cityof.plummer@verizon.net	P. O. Box B Plummer, ID 83851	208-686-1641
Raft River Rural Electric Jim Powers, Mgr.* jimpowers@rrelectric.com	P. O. Box 617 Malta, ID 83342	208-645-2211
City of Rupert Roger Bagley roger.bagley@rupert.id.us	P.O. Box 426 Rupert, ID 83350	208-436-9600
Salmon River Electric Coop Ken Dizes Mgr. ken@srec.org	P. O. Box 384 Challis, ID 83226	208-879-4417
Bob Boren* rboren@custertel.net	HC 67 Box 742 Clayton, ID 83227	208-879-4417
City of Soda Springs Lee Godfrey* lgodfrey@sodaspringsid.com	9 West 2nd South Soda Springs, ID 83276	208-547-2600
South Side Electric Lines Sheila Hubsmith, Mgr.	P. O. Box 69 Declo, ID 83323	208-654-2313

United Electric Co-op Ralph Williams, Mgr. rwilliams@unitedelectric.coop	1330 21st Street Heyburn, ID 83336	208-679-2222
Ronald Osterhout* (Sec'y/Treas) rosterhoust@unitedelectric.coop	P. O. Box 608 Burley, ID 83318	208-878-7000
City of Weiser Nate Marvin* natem@ruralnetwork.net	55 W. Idaho Street Weiser, ID 83672	208-549-1965
Don Loos	55 W. Idaho Street Weiser, ID 83672	208-549-1966
*** ICUA Director**		
ICUA Attorney:		
Ron Williams **ron.williams@rmci.net**	PO Box 2128 Boise, ID 83701-2128	208-344-6633
Associate Members:		
Idaho Energy Authority Jo Elg Fikstad jfikstad@ifpower.org	P. O. Box 50220 Idaho Falls, ID 83405	208-529-1429
NW Energy Efficiency Alliance Elaine Miller emiller@nwalliance.org	522 SW Fifth Ave, Suite 410 Portland, OR 97204	503-827-8416
PNGC Power Pat Reiten pat_reiten@pngc.com	711 NE Halsey, Suite 200 Portland, OR 97232	503-288-1234
Utah Associated Municipal Power Systems Douglas Hunter doughunter@sisna.com	2825 E. Cottonwood Pkwy Salt Lake City, UT 84121	800-872-9561

G. Idaho Consulting and Development Companies

Renaissance Engineering & Design PLLC – Consultant for Energy Projects – All Types – Large and Small Wind Analysis and Development, Biomass, Solar, Etc.
7800 Alfalfa Lane
Melba, Idaho 83641
phone 208-495-1111 fax 208-495-1555
Contact: Brian D. Jackson, PE MBA CEM
brian@clever-ideas.com
www.clever-ideas.com

Wind Advantage – Anemometer Tower Installation and Jacobs Dealer
605 South 600 West
Burley, Idaho 83318
(208) 678-8469   fax (208) 677-1175
Contact: LeRoy Jarolimek
leroyjarolimek@hotmail.com

Aurora Power & Design – Small Wind and Alternative Energy
3412 N 36th St
Boise, ID 83703
(208) 342-0454
Contact: Mike Leonard

Palouse Wind & Water – Small Wind Systems
1011 Rothwell Road
Viola, ID 83872
(208) 883-3676 fax (208) 883-3298
Contact: Joe Singleton
pwindh2o@moscow.com

Four Moore Inc.- Medium scale wind power development
PO Box 9868
Moscow, Id 83843
(208) 892-3524
Contact: Kelly M Moore

Exergy Development Group of Idaho, LLC– Medium and Large Project Developer
910 W. Main St., Suite 310
Boise, ID 83702
(208) 336-9793
Contact: James Carkulis
mtli@in-tch.com

Energy Vision, LLC – Small and Medium Project Developer
672 Blair Ave.
Piedmont, CA 94611
(510) 655-7600
Contact: Glenn Ikemoto
glenni@pacbell.net

Windland, Inc. – Large Project Developer
7669 West Riverside Drive, Suite 102
Boise, ID 83714
(208) 377-7777
wind@windland.com

Ridgeline Energy, LLC – Large Project Developer
983 E. Holly
Boise, ID 83712
(208) 841-5037
Contact: Rich Rayhill
rrayhill@rl-en.com

Lafee Energy – Small Wind and Alternative Energy
4833 Kuna Rd.
Kuna, ID 83634
(208) 465-0093

H. Major Manufacturers

- **Clipper Wind Power**, www.clipperwind.com: Major US manufacturer of large wind turbines – 2.5 MW units with 4 generators and special gearing arrangement.
- **Enercon** –www.enercon.de/en: German large wind turbine manufacturer.
  Furlander – www.fuhrlaender.com: German large wind turbine manufacturer.
- **Gamesa** – www.gamesa.es: Spanish manufacturer of large wind turbines.
- **GE Wind Energy** – www.gepower.com/dhtml/wind/en_us: Major US manufacturer of large wind turbines**,** particularly the 1.5 MW units.
- **Mitsubishi Power Systems** – www.mpshq.com/products_wind.htm: Major manufacturer (Japan) of turbines 600 KW and 1 MW units.
- **Suzlon** – www.suzlon.com: Major manufacturer (India) of large wind turbines, particularly 1.25 MW and 2.1 MW.
- **Vestas Wind Energy** – www.vestas.com: Major manufacturer of large wind turbines including former NEG Micon acquisition in Denmark.

I. Small wind turbine manufacturers, dealers, supplies

- **NRG Systems** – www.nrgsystems.com - U.S. manufacturer of wind-data measurement products
- **Bergey Windpower** - www.bergey.com - Small wind turbine manufacturer
- **Baywinds -** www.baywinds.com - Jacobs line of wind turbines
- **Solardyne** - www.solardyne.com - Sales of solar and wind equipment and energy-efficient appliances.
- **Gridwatch** - www.gridwatch.com - guide to renewable energy (including wind) organizations, consultants, and manufacturers.
- **Home Power Magazine** - www.homepower.com - information on resources, incentives, off-grid systems, and other renewable energy sources.
- **Jade Mountain** - www.jademountain.com - purchase renewable energy equipment, books, and energy-efficient appliances.
- **Real Goods Renewables** - www.realgoods.com - purchase renewable energy equipment, books, and energy-efficient appliances.

J. Featured County Planning and Permitting Contacts:

1. Jerome County

Jerome County Planning & Zoning
121 3rd Avenue East
Jerome, ID 83338
Phone: 208-324-9262 Fax: 208-324-9263
www.jeromecounty.org
Art Brown, Administrator: abrown@co.jerome.id.us
Yvette Le Mon, Administrative Assistant: ylemon@co.jerome.id.us

2. Bonneville County

Bonneville County Planning & Zoning
605 N Capital Ave
Idaho Falls, ID, 83402
Phone: (208) 524-7920 ext. 3
www.co.bonneville.id.us
Steve Serr, Administrator: sserr@co.bonneville.id.us
Suzanne Stoddard, Administrative Assistant: sstoddard@co.bonneville.id.us

3. Cassia County

Cassia County Planning & Zoning
1459 Overland Ave.
Burley, Idaho 83318
Phone: (208) 878-7302 Fax: (208) 878-9109
www.cassiacounty.org
Dan Barker, County Building Official: dbarker@cassiacounty.org

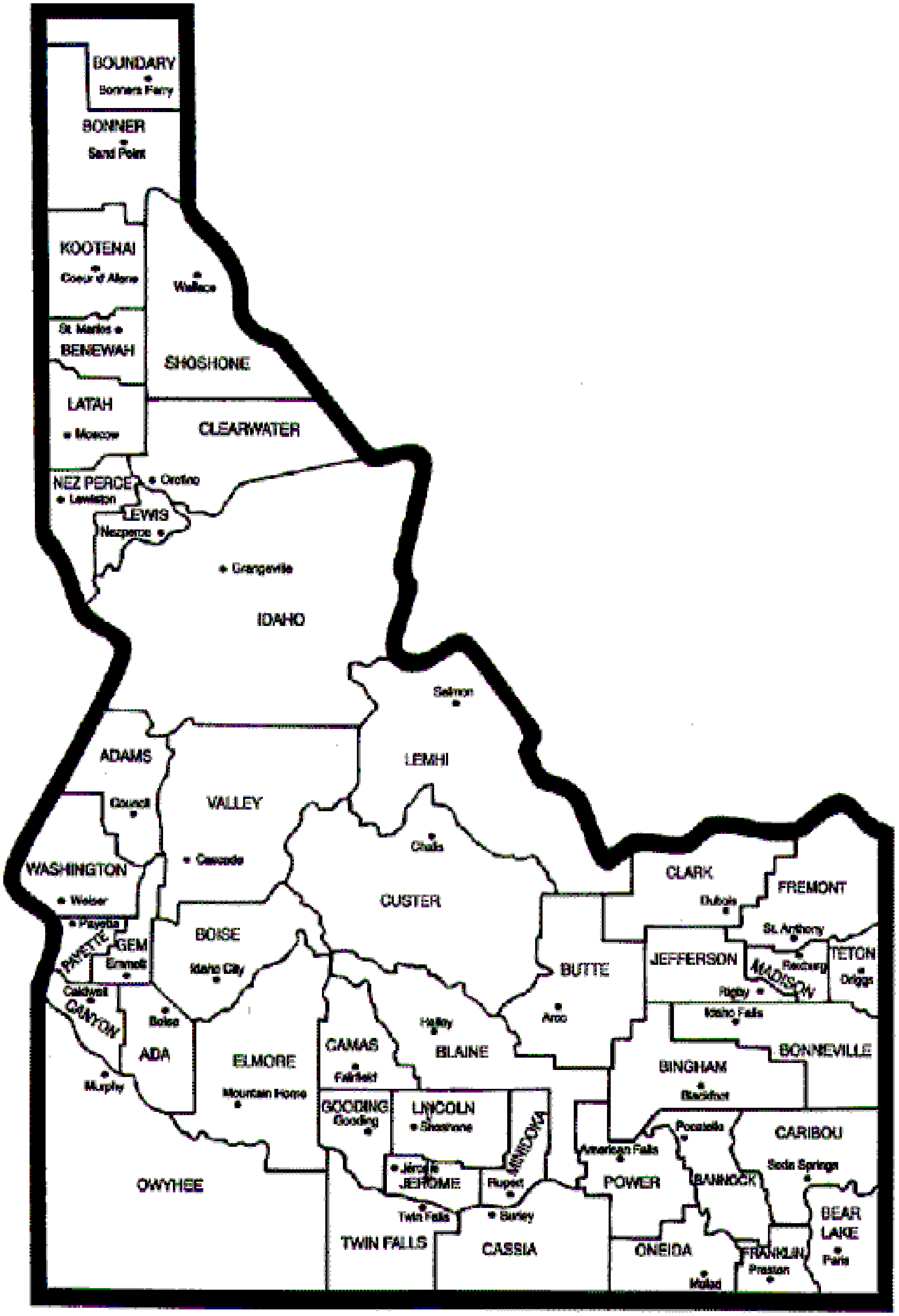
4. Elmore County

Growth and Development Office
520 East 2nd South
Mountain Home Idaho 83647
Office: (208) 587-2142, ext 269 Fax 208.587.2120
www.elmorecounty.org
Bonnie Sharp, Director - Elmore County Growth and Development:
bsharp@elmorecounty.org

5. Twin Falls County

Planning and Zoning Administration
246 Third Avenue East
Twin Falls, Idaho 83301
Office: (208)734-9490 Extension 4 Fax (208)733-9645
www.twinfallscounty.org
Susan J. Switzer, Administrator – Twin Falls County Planning and Zoning
Administration: sswitzer@co.twin-falls.id.us

K. All Idaho Counties and Contact Info:



- Ada County
  www.adaweb.net
- Adams County
  www.co.adams.id.us
- Bannock County
  www.co.bannock.id.us
- Bear Lake County
  www.bearlakecounty.info
- Benewah County
  www.state.id.us/aboutidaho/county/benewah
- Bingham County
  www.co.bingham.id.us
- Blaine County
  www.co.blaine.id.us
- Boise County
  www.co.boise.id.us
- Bonner County
  www.co.bonner.id.us
- Bonneville County
  www.co.bonneville.id.us
- Boundary County
  www.boundary-idaho.com
- Butte County Sheriff
  www.buttecountysheriff.net
- Camas County
  www.state.id.us/aboutidaho/county/camas
- Canyon County
  www.canyoncounty.org
- Caribou County
  www.accessidaho.org/aboutidaho/county/caribou
- Cassia County
  www.cassiacounty.org
- Clark County
  www.state.id.us/aboutidaho/county/clark
- Clearwater County
  www.clearwatercounty.org
- Custer County
  www.co.custer.id.us
- Elmore County
  www.elmorecounty.org
- Franklin County
  www.state.id.us/aboutidaho/county/franklin
- Fremont County
  www.co.fremont.id.us
- Gem County
  www.co.gem.id.us
- Gooding County
  www.state.id.us/aboutidaho/county/gooding
- Idaho County
  www.idahocounty.org
- Jefferson County
  www.state.id.us/aboutidaho/county/jefferson
- Jerome County
  www.jeromecounty.org
- Kootenai County
  www.co.kootenai.id.us
- Latah County
  www.latah.id.us
- Lemhi County
  www.state.id.us/aboutidaho/county/lemh
- Lewis County
  www.lewiscountyid.org
- Lincoln County
  www.state.id.us/aboutidaho/county/lincoln
- Madison County
  www.co.madison.id.us
- Minidoka County
  www.minidoka.id.us
- Nez Perce County
  www.co.nezperce.id.us
- Oneida County
  www.co.oneida.id.us
- Owyhee County
  www.owyheecounty.net
- Payette County
  www.payettecounty.org
- Power County
  www.co.power.id.us
- Shoshone County
  www.state.id.us/aboutidaho/county/shoshone
- Teton County
  www.mycommunity.com/teton
- Twin Falls County
  www.twinfallscounty.org
- Valley County
  www.state.id.us/aboutidaho/county/valley
- Washington County
  www.ruralnetwork.net/~wcassar

XIV. Appendices

A. Idaho Wind Resources

There is a substantial amount of windy land in Idaho – only a fraction of that land could actually be developed commercially. The National Renewable Energy Laboratory (NREL) estimates that there are over 800,000 acres of windy land in Idaho with potential generation of 49 million MWh/yr. (*That's $2.45 Billion per year of energy at $0.05 per kwh).* In comparison Idaho Power's largest hydro electric powerplant at Brownlee Reservoir contains four 90.1 megawatt (MW) generators and one 225-megawatt (MW) generator with a combined capacity of generating 3.3 million megawatt hours (MWh) of electricity. That would be enough energy to meet the electrical needs of more than 250,000 residential customers. The total nameplate capacity of the entire Hells Canyon complex of dams including Brownlee, Oxbow, and Hells Canyon is Idaho is actually 1,166 MW. The amount of available wind power far exceeds all of the developed hydro generation in the state. Idaho is ranked 13th in the nation as far as wind potential while California is ranked 17th in potential for wind generation. Nonetheless, California has over 2,000 MW of installed capacity representing around $2 billion of total capital investments and serious power generation capacity. Idaho as of the summer of 2005 had just over 10MW total developments. Idaho thus has an incredibly large, virtually untapped potential to generate meaningful amounts of energy with this renewable resource, much as the renewable hydroelectric generation projects were developed in the last century. The Renewable Energy Atlas of the West – Idaho State Edition states: "In general wind regimes of Class 4 or higher are considered economically viable for utility-scale wind farms. Small-scale distributed wind turbine systems require less wind for economic viability and have been successfully installed in Class 3 wind regimes." One key hurdle besides locating spots with a substantial wind resource itself is ultimately the availability to move the power from a project on the existing utility transmission and distribution grid. Small and medium sized projects often have higher capital costs on a $/MW basis, but can be installed on the distribution system as net metering projects or distributed generation projects and may entirely avoid transmission interconnection and the associated costs and losses to the project.

The wind industry in general is established and growing rapidly at about 30% per year around the world. The total capacity is around 40,000 MW worldwide with over 6,000 MW in the United States. This industry has grown from a small start in the 1980's to a $7B annual industry connected to over 40,000 jobs worldwide in about 20 years. Most commercial developers focus on 100 MW+ projects; however several smaller sized projects are currently under development by farmers and ranchers.

B. Idaho Wind Potential by County

The wind energy potential in each county varies widely. One difference is the total wind resource available. Another difference is the amount of land with a high wind potential which could potentially be developed. The following exhibits show the wind map depictions for each county.

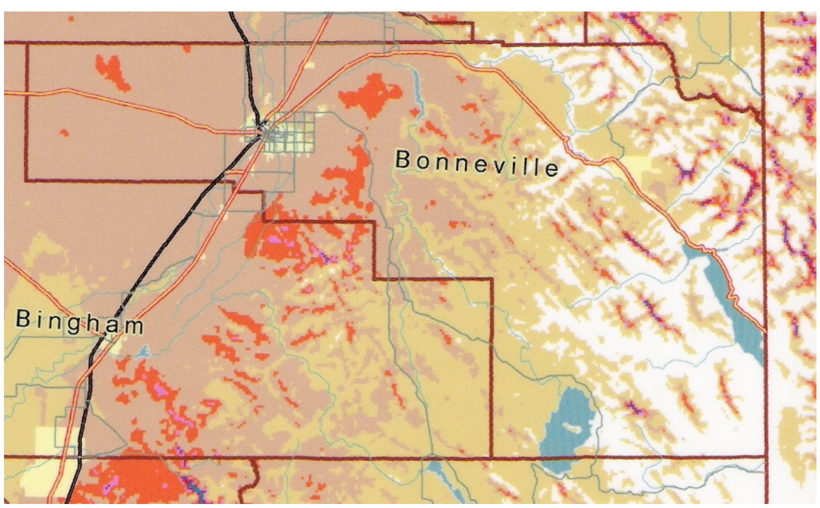
Legend for Wind Resource Maps

Wind Power Classification

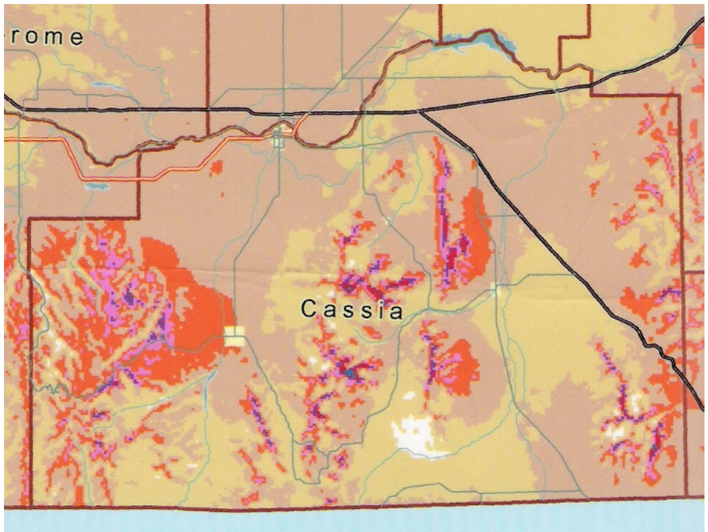
Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m^2	Wind Speed[a] at 50 m m/s	Wind Speed[a] at 50 m mph
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

[a] Wind speeds are based on a Weibull k value of 2.0

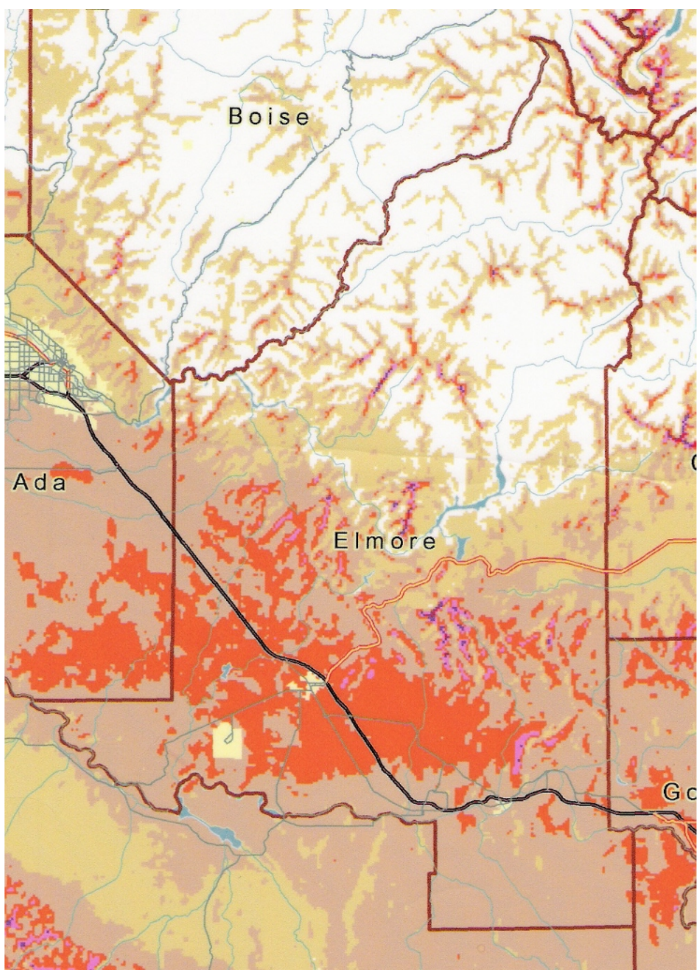
Bonneville County Detail:



Cassia County Detail:



Elmore County Detail:



Jerome County and Twin Falls County Detail: